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BULLETIN NO. 22

BUREAU OF EDUCATIONAL RESEARCH
COLLEGE OF EDUCATION

CONSERVATION OF INTELLIGENCE IN ILLINOIS HIGH SCHOOLS

By

Charles W. Odell
Associate, Bureau of Educational Research

Price 30 cents

PUBLISHED BY THE UNIVERSITY OF ILLINOIS, URBANA
1925

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BUREAU OF EDUCATIONAL RESEARCH
College of Education
University of Illinois, Urbana

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UNIVERSITY
OF ILLINOIS
PRESS

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INTRODUCTORY STATEMENT

In this bulletin Dr. C. W. Odell presents the result of a comprehensive inquiry relating to the intelligence, educational plans, and vocational intentions of high-school seniors in Illinois. This information, supplemented by the results of similar investigations in other states, he has used in studying certain questions relating to the conservation of human talent. The importance of the questions considered should make this bulletin one of interest not only to those connected with high schools but also to those who deal with college students.

As will be evident to the reader, the assemblage of information relative to seniors in Illinois high schools was made possible only through the cooperation of a large number of high-school principals and teachers. To all who have contributed to this investigation the Bureau of Educational Research gratefully acknowledges its indebtedness.

WALTER S. MONROE, *Director*
Bureau of Educational Research.

January 15, 1925.


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CONSERVATION OF INTELLIGENCE IN ILLINOIS HIGH SCHOOLS

CHAPTER I

THE CONSERVATION OF HUMAN INTELLIGENCE

Importance of the problems of conserving human intelligence. Although the problem of conserving human intelligence has attained prominence only within the last few years and although even now its significance is realized by few persons except psychologists and educators, it must be accorded an important place among the problems of today. Many years probably will elapse before it receives as much attention from the general public as does the conservation of material resources at present. Indeed it may never receive as much, since the average individual is more concerned with what affects his economic than with what affects his intellectual welfare and since the advantages of conserving material resources are much more apparent than those of conserving non-material resources. The assertion has been made, however, that the actual economic loss due to our failure to develop and utilize the mental resources of our citizens to the best advantage is greater than that resulting from all the waste of our material resources.

Ways in which human intelligence is wasted. Waste of human intelligence occurs when an individual does not receive the educational training best suited to him, or when he does not enter the occupation in which he can render the greatest service to society. The first of these sources of waste is due largely to imperfections in our educational system; the second, to the lack of adequate vocational guidance.

Waste occurs in training children and adults when they lack sufficient capacity (intelligence) to profit satisfactorily from the particular course of training pursued. In such cases the effort to train is partially or even wholly wasted because it does not succeed. There is also waste when the course of training does not completely develop one's intellectual capacity.

The occupational service which one may render to society obviously depends upon the training which he receives, but is affected

also by the relation between his ability as developed by training and the demands of his occupation. If a person's occupation requires ability in excess of that which he possesses, he will fail to render as great service as in an occupation requiring a lesser degree of ability. On the other hand, he fails to render his maximum service when his occupation requires less ability than he possesses. The waste in the latter case is likely to be accentuated by dissatisfaction and loss of interest on the part of the worker.

The service which individuals render to society also depends upon the social need for the occupation for which they have received special training. If the supply of trained workers for a particular occupation is in excess of the social need for such workers this group cannot render its maximum service. Training for occupations of little social value also does not yield large social returns.

Many of those who are interested in the conservation of human intelligence have asserted, and the writer is in accord with this point of view, that the largest source of waste is due to our failure to discover and to train appropriately individuals possessing superior intelligence and to guide them into suitable occupations after they are trained. It is pointed out that we are accustomed to give much attention to providing training and guidance for children of inferior intelligence, and it is asserted that, although this interest in such children is commendable, our efforts to train them will yield much smaller social dividends than would similar efforts devoted to the education of children possessing superior intelligence.

Cause of the present interest in the conservation of human intelligence. The fact that the problem of conserving human intelligence is now receiving considerable attention is due chiefly to three movements which have themselves become prominent since the beginning of this century. The first of these is that for the conservation of material resources. The other two, which are closely connected, and indeed might almost be called one, are the application of scientific methods in education and the intelligence test movement.

1. **The conservation of material resources.** Although attempts to arouse public sentiment in favor of conserving our material resources were made prior to 1900, it was not until the beginning of the twentieth century that wide-spread public interest was aroused and effective action begun. When Roosevelt became president we were just beginning to recognize that many of our material resources had been and were being dissipated at an alarming rate

and that almost no attempt to replace them was being made. Many forms of animal life, of which the wild pigeon and the bison are the most outstanding examples, had been entirely or almost exterminated. Our forests, which once seemed inexhaustable, were being leveled at an ever-increasing rate and their entire destruction appeared to be a matter of comparatively few years. The supply of natural gas, once so abundant that it cost less to allow street lights to burn all day than to extinguish and relight them, had become exhausted in many localities. It was predicted that at the growing rate of consumption our supply of oil soon would be consumed.

These examples are only a few of the many that might be cited to illustrate the thoughtless consumption and waste that prevailed in this country. Largely through the efforts of President Roosevelt and others associated with him, a beginning was made in enacting laws which provided for the conservation and renewal of our resources. The movement grew, when once fairly started, until now many such laws are upon our statute books and public sentiment in their support has been fairly well aroused. Since this movement has become established, it is natural that the principle underlying it should be applied also to the question of conserving our non-material resources. The chief non-material resource which we possess is the intelligence of our people.

2. **The application of scientific methods in education.** With negligible exceptions educational thought and practice in the past have been controlled by tradition and opinion rather than by fact. Within the last decade or two, scientific methods more or less similar to those already used in the physical sciences have been introduced in the study of problems in education and the other social sciences. The application of these methods, including statistical procedures, has rendered it possible for us to study more critically and clearly questions relating to the conservation of human intelligence. Investigations can be made, data compiled, and experiments carried out with some assurance that the results will be significant.

3. **The intelligence test movement.** Although the intelligence test movement is a part of the general application of scientific methods in education, it is such a major part and its contribution to arousing interest in the problem of conserving human intelligence has been so great that it deserves special mention. The development of individual intelligence tests within the last seven or eight years has been phenomenal. Perhaps the most outstanding fact revealed

by the use of tests has been the wide range of individual abilities in almost any group of people. Even though it was recognized that all individuals were not cast in the same mental mold, few persons suspected that the differences were of such great extent as has been found to be the case. Therefore, we realize as never before that all individuals will not profit equally by the same training nor succeed equally well in a particular occupation. A second reason why the intelligence test movement has contributed to the interest in the conservation of human intelligence is that the development of such tests offers instruments of great value in the study of the problem. Naturally, more attention is given to studying a problem when suitable aids are at hand.

Purpose of this monograph. The primary purpose of this monograph is to discuss the general problem of conserving human intelligence as applied to high-school seniors. Stated more narrowly, it is to present certain facts relative to the educational and vocational plans of high-school seniors and to indicate the probable degree of waste of their mental ability, due to: (1) plans for educational training and vocational entrance which are not appropriate to the degrees of intelligence possessed by the students; and (2) the lack of agreement between the probable need for workers trained along various lines and the vocational intentions of the seniors.

The fulfillment of this primary purpose leads naturally to the second problem of how to reduce the present waste of the intelligence of high-school seniors to a minimum. The facts that will be presented in the following pages suggest that certain procedures are needed, but the writer will content himself with stating these needs in very general terms, and will not enter upon a detailed discussion of the means and methods to be employed in educational and vocational guidance.

Limitations of this study. (1) The amount of waste cannot be determined accurately. This study was not undertaken, as might be implied by the secondary purpose stated above, with the belief that all waste can be eliminated. In the first place, we cannot predict with a high degree of accuracy how much society will profit from giving an individual a particular kind of training, or from having him enter a certain occupation. Furthermore, the demands for workers in different occupations vary with changes in social and economic conditions. Therefore, we cannot know in advance what the future needs for workers in the different occupations will be.

Although we can predict neither the contribution an individual will make to society, nor what society's needs for workers will be, and, hence, cannot eliminate all waste of human intelligence, nevertheless we can hope to reduce the degree of waste probably by a great amount. Therefore, the second purpose mentioned above is justifiable.

(2) **Success in college and in a vocation cannot be predicted reliably.** Perhaps the most serious limitation upon this study is that the prognostic value of intelligence test scores is at best only fairly high. Even if the errors due to the unreliability of tests are neglected and the scores obtained are taken as accurate and reliable measures of mental ability, it cannot be assumed that they enable one to predict success, in college or vocation, with a high degree of accuracy. As to the former, we know that many other factors besides mental ability have a part in determining an individual's success in higher education. On the other hand, the correlation between college success as measured by the marks given and the results of intelligence tests appears to be higher than that between such success and any other single item of information that is available.[1]

It is probable that the correlation between vocational success and intelligence is lower than that between college success and intelligence. Indeed, it has been asserted by such an expert in the field as Charters that, "If we . . . seek to predict success in business from intelligence scores, the case is strikingly hopeless . . . The correlation between intelligence scores and success in business . . . hovers around zero."[2] This extreme statement of Charters does not seem, in the writer's opinion, justified. In the first place, other students in this field have concluded that there is some positive correlation between intelligence and vocational success. Furthermore, many employers and others in business manifest their belief in the practical value of intelligence tests for selecting those whom they wish to employ or promote. It is, of course, true that the problem of selecting

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[1]In view of the evidence from various studies which have been reported in educational literature the writer believes that the more or less dogmatic statement made above is justified. Space does not permit of offering arguments to support it. Any one who is interested can find numerous discussions of the matter. A bibliography listing a number of these may be found in Wood, Ben D. "Measurement in Higher Education." World Book Company, Yonkers: 1923. p. 331-34.

[2]Charters, W. W. "Personality and Intelligence." Columbus, Ohio: Proceedings Fourth Annual Session of the Ohio State Educational Conference. The Ohio State University Bulletin, August, 1924. 29:24-31.

an employe for a specific job differs from that of giving general vocational guidance, but there are many common elements. Also, although many other qualities, such as industry, perseverance, tact, self-confidence, etc., play a large part in vocational success, there is no reason to believe that these vary inversely with intelligence and, therefore, nullify its presence. Even Charters would certainly not assert that a person with an I. Q. of 50 or 60 could become a successful surgeon, engineer, or business executive. Neither does the fact, if it be a fact, that the correlation between intelligence and vocational success is so low at present prove that this condition is inherent in the nature of intelligence and the requirements for occupational success. It may be that the low correlation is due in part to the lack of proper educational and vocational guidance in the past.

CHAPTER II

THE DATA USED IN THIS STUDY

Source of date. The data which form the basis for the study of the problems mentioned in Chapter I were derived from several sources. Those of which most use will be made were obtained in a study of the high-school seniors of Illinois conducted by the Bureau of Educational Research. Since no account of this investigation has appeared in print, a fairly detailed description of it will be given in the first portion of this chapter. Data from three other similar studies also will be used. These studies, which were carried on in the states of Indiana, North Carolina and Massachusetts, have been reported in print[1] elsewhere, and therefore need only brief descriptions here. Another source from which a few data were obtained and which also is described elsewhere was the report of the work done in our army during and following the World War.

The Illinois study. This study was conducted in the autumn of 1923, and all the four-year public high schools in the state of Illinois were invited to participate. The number, size, and distributions of the schools cooperating are shown in Table I. In this table the entries in the first column show the actual numbers of schools from which data were secured, whereas those in the second show the percents that these schools were of all four-year high schools.[2] An examination of this table shows that the number of schools included as well as their distribution was such that the results may be considered representative of the state of Illinois. In only one division were less than one-third of the high schools included, whereas in several about two-thirds participated. The total number of schools contributing data was 368, or about four-sevenths of all the four-year

[1]See p. 15-16 for references.

[2]Immediately after the point scores had been tabulated, a "Preliminary Report of Study of High-School Seniors" in mimeographed form was prepared and distributed to the schools which participated. This report contained the distributions of point scores by sizes of schools and sections of the state. After this had been issued it was found that the scores of several schools had been inadvertently omitted and also that it contained a few errors. Therefore small discrepancies exist between some of the data given here and elsewhere in this bulletin and those in the preliminary report.

high schools in the state, and the number of seniors about 12,300[3] or almost exactly one-half of all in Illinois.

All of the schools which signified their willingness to participate were sent a sufficient number of copies of the Otis Self-Administering Test of Mental Ability, Higher Examination, Form A, and of the "Information Blank for High-School Seniors,"[4] prepared for use in this investigation, for all seniors. This blank called for the following items of information:

Name
Sex
Date of Birth
Age on September 1, 1923
Name of school
Town or city
Intentions concerning further education
    Intention of continuing or not
    Institution
    Course
    Major subject
Vocational choice
Father's occupation
Information as to previous intelligence tests taken
Units of high school credit
High-school subjects liked most
High-school subjects liked least
Number of failures in high school
Average school mark in high school[5]

The tests were administered by the principals or by teachers whom they designated. Most of the testing was done on October 4; a little, a day or two before this date, some a few days afterwards.[6] In no case was the delay great enough that the mental growth of the seniors during the elapsed time would be likely to result in their making even one point more on the test. All scoring was done in the offices of the Bureau of Educational Research.[7] After the papers had

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[3]As the data asked for were not completely given by all seniors, the number of cases in each tabulation is less than the figure given above.

[4]A copy of this blank and the instructions for filling it out may be found in Appendix A.

[5]Only a minority of the schools furnished the average school marks of their seniors. They were supplied for approximately 2700 individuals.

[6]The test papers from a few schools were received so late that they were not included in the tabulations made.

[7]In a few cases teachers or principals had scored the papers before they were returned to the Bureau. In all such instances the scores already computed were checked by rescoring.

TABLE I.—NUMBERS, SIZES AND DISTRIBUTION OF HIGH SCHOOLS THAT PARTICIPATED IN THE ILLINOIS INVESTIGATION[a]

Class	Enrollment	Section of State[b]							
		Northern		Central		Southern		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
I	1000 or more	10[c]	33[d]	2	50	0	(—)[e]	12	35
II	500 — 999	6	29	4	44	7	58	17	40
III	300 — 499	8	53	4	44	11	79	23	61
IV	100 — 299	51	65	54	62	17	40	122	59
V	1 — 99	88	61	83	63	23	43	194	59
Total		163	56	147	62	58	48	368	57

[a] For the explanation of certain discrepencies between the figures in this table and those in the preliminary report see Note 2, on page 13.

[b] The three sections of the state are those into which the state is divided for the purpose of electing members of the Illinois State Teachers Examining Board. Each section includes the same number of counties, 34.

[c] Half of these are in the city of Chicago.

[d] The figures in this column show the percents of all four-year high schools included.

[e] There were no high schools of 1,000 or more pupils in the southern part of the state.

been scored, intelligence quotients were computed according to the method prescribed by Otis in his Manual of Directions.

The Indiana study. The Indiana study[8] of high-school seniors, which was conducted by Book and others during the school year of 1918-19, seems to have been the first investigation of this general type carried on in our country. It included about 6.000 high-school seniors of Indiana and was, therefore, indicative of statewide conditions. As in the Illinois study, each senior took a mental test and filled out a questionnaire which called for a dozen or more items of information. A number of these items were almost or exactly the same as in the Illinois investigation and the others were of the same general character.

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[8] Book, W. F. The Intelligence of High School Seniors. New York: Macmillan Company, 1922. 371 p.

Book, W. F. A preliminary report on the state-wide mental survey of high school seniors. Indiana University Extension Division Bulletin, Vol. 6, No. 1, p. 31-67. (Contains a brief summary of the study.)

The North Carolina study. This study[9] was in many ways similar to those made in Illinois and Indiana. The investigation was carried on about two years ago, and somewhat less than 1,000 seniors were included. Although this number seems rather small, it must be remembered that the population of North Carolina is somewhat less than that of Indiana and considerably less than that of Illinois, and also that the proportion of children who become high-school seniors is less. The sampling, therefore, is more adequate than may appear at first thought. In the North Carolina investigation also, a mental test was administered to the seniors and a number of items of information, very similar to those used in the Illinois study, were collected.

The Massachusetts study. The Massachusetts study[10] was carried on about the same time as the one in North Carolina, and included more than 3,000 seniors. Comparing this number with the population of the state of Massachusetts, it is evident that a less adequate sampling was obtained than in the case of Illinois and Indiana. The number, however, is large enough to warrant confidence in the data. An intelligence test was given to the seniors and answers to sixteen questions were asked for. In general these questions were along the same lines as those in the investigations previously described.

United States army data. In the final report of the work done in our army during and following the World War, there is presented a tabulation of the intelligence test scores of large numbers of men according to the occupations in which they stated they had been employed.[11] It is probable that this work gave the greatest impetus, which has been received from any source, to studies similar to those reported in this bulletin. Although we are not justified in assuming that the results of the army investigation reveal the optimum degrees of intelligence for the occupations represented, we

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[9]Trabue, M. R. Abilities of North Carolina high-school pupils. The High School Journal, Vol. 7, p. 3-8. January, 1924.

Mann, G. W. Selective influence of desire to attend college. The High School Journal, Vol. 7, p. 8-9. January, 1924.

Holland, A. C. Some relations between ability and vocation. The High School Journal, Vol. 7, p. 10-14. January, 1924.

[10]Colvin, S. S., and McPhail, A. H. Intelligence of Seniors in the High Schools of Massachusetts. Bureau of Education, Bulletin 1924, No. 9, 39 p.

[11]Yerkes, R. M., Editor. Intelligence Ratings of Occupational Groups. Chapter 5:819-37. Memoirs of the National Academy of Sciences. Vol. 15, Part III.

can make some use of them. They indicate, although they do not prove, that in many lines of work there are to be found only a few persons who possess less than a certain degree of intelligence and only a few who possess more than a certain degree. This is evidence that there are approximate upper and lower limits in some vocations. It is true that these limits have been determined by the interaction of many social forces, but it is probable that the chief factor in their determination is the level of intelligence necessary to a fair degree of success in various occupations.

The accuracy and reliability of the data. (1). The intelligence test results. Many of the data, and especially the measures of intelligence, gathered in all the investigations referred to are not highly accurate and reliable. With the exception of a few of the army results, all the measures of intelligence were secured through the administration of group tests. There is always the possibility, and indeed the probability, that a small percent of the scores so obtained are very much in error and that many of them are inaccurate by small amounts. One is not justified, therefore, in assuming that the score resulting from a single application of a group intelligence test is an accurate or reliable measure of the mental ability of the individual making it. On the other hand, the variable errors present in the scores tend to be equally distributed in both directions. That is, if any considerable number of individuals are tested, it is probable that there will be just about as many scores that are too large by any given amount as there are scores that are too small by the same amount. Since the tests were given in many schools under different conditions and by different examiners, it is very improbable that the same constant errors would be present in all, or even a large proportion of, the scores. In other words, errors that are constant for any one school or examiner become variable when all are considered in one group.[12] Therefore, except at their extremes,[13] the total

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[12]This not true of the I. Q.'s derived from the point scores made on the test used in the Illinois study. Because of the method of computing them suggested by Otis, a constant error is involved. This will be explained in more detail later when the I. Q.'s are presented and discussed.

[13]This exception is made because one effect of variable errors is to cause the extremes of a distribution of obtained scores to be more extreme than those of the true scores would be. That is, at the upper end of the obtained distribution there are likely to be some scores larger than any true score, and at the lower end some that are smaller.

distributions of scores obtained are in all probability indicative of the distributions of intelligence of the whole groups of seniors who made them and the averages derived from the distributions are rather highly reliable.[14]

In the presentation and interpretation of the data from the intelligence tests the fact that errors are present will be taken into account. Since conclusions based upon a very small number of cases would not be justified, the writer has not included inferences suggested by the smaller groups of data.

2. **The school marks.** As has been stated previously, the average school marks of about 2,700 of the seniors included in the Illinois study were secured. These marks undoubtedly contained at least as large and as frequent errors as do the intelligence test scores. The fact that teachers are more or less subjective in their marking cannot be denied. As before, however, these errors will tend to balance one another. Furthermore, it cannot be assumed that perfectly objective school marks, if they could be secured, would be satisfactory measures of mental ability. Although intelligence is probably most potent in determining the school mark of any individual, many other factors, such as industry, interest, health, family traditions, etc., enter into the situation. For this and other reasons, the marks obtained in the Illinois study will be presented very briefly and only slight reference made to them.

3. **The intentions of the seniors.** Another source of more or less unreliability in the conclusions is that the intentions of the seniors as to higher education and future occupations cannot be depended upon as representing what they will actually do. In all probability most of the seniors were sincere in expressing their intentions, although there is no doubt that some of those who were undecided gave the answer that they thought would sound best. A more important source of error is that many of them will change their minds. This likely will occur more often with reference to the occupations to be entered than to the higher education to be secured. It is not probable that the changes will balance or offset each other. Undoubtedly many more individuals will change from their present

[14]For the benefit of those who have not made a study of statistics it is, perhaps, well to mention that the reliability of an average increases with the square root of the number of cases included. For example, an average based upon 100 cases is 10 times as reliable as a single measure, one based upon 900 is 30 times as reliable as a single measure or 3 times as reliable as one based upon 100, and so on.

plans to less ambitious ones than will do the opposite. That is to say, the general tendency will be to secure less college education than intended originally and to enter occupations that do not rank as high in social esteem and opportunities for material returns as those first selected. It is, moreover, very difficult to estimate how great these changes will be. The writer does not believe that they will be great enough to invalidate the use of data as to college and vocational intentions. However, the conclusions reached should not be based upon small numbers of cases or small differences, nor should they be accepted without a reasonable degree of caution.

CHAPTER III

THE INTENTIONS OF HIGH-SCHOOL SENIORS RELATIVE TO HIGHER EDUCATION

The problem of this chapter. The principal question to be answered in this chapter is, "How great is the waste of human intelligence which results: (1) because some high-school seniors of superior intelligence plan to secure either no additional training or training that is comparatively short and easy; and (2) because some seniors of inferior intelligence plan to pursue courses of training which are so long and difficult that it is unlikely they will be able to complete them successfully.

No attempt will be made to answer this question in precise quantitative terms but pertinent evidence will be presented and the implications of the data pointed out. Incidentally there will be some comment upon the degree of agreement between the distribution of high-school seniors according to their vocational intentions, as indicated by their educational plans, and the social demand for such workers. This latter question will be treated more fully in Chapter IV.

Plan of assembling data obtained in the Illinois study. The information relative to the college intentions[1] of Illinois high-school seniors was tabulated or classified in several ways. The primary classification was on the basis of sex. Another basis referred to the length of training provided by higher institutions, those offering less than four years being placed in one group and those offering a course of four years or more in another. The third was according to the type of training which the seniors expected to secure. The following classes were used: agriculture, commerce, education, English, law, liberal arts, library, medicine, military and physical training, music, and miscellaneous. Some students indicated that they were undecided in regard to their educational plans and others stated that they did not expect to attend college, so two additional classes were needed for these individuals. Thus in respect to college intentions the seniors were classified in thirteen groups.

[1]The higher institutions named by the seniors numbered about 250. The list is not given because of its length.

With reference to intelligence the seniors were grouped on the basis of their intelligence quotients into the following eight classes; 60-69, 70-79, 80-89, 90-99, 100-109, 110-119, 120-129, and 130-139.

Relationship between college intentions and intelligence of Illinois high-school seniors. In Table II will be found a summary of the facts relative to the college intentions and to the intelligence of the senior boys in the Illinois high schools from which information was secured. Table III presents a similar summary for the senior girls. To illustrate how these tables are to be read the first line of Table II may be used. It shows that 260 boys indicated that they expected to secure college training in the field of agriculture at institutions offering at least four years of work and that none were planning to take agricultural training in schools offering less than four years of work. Three of these boys had intelligence quotients between 70 and 79, eighteen between 80 and 89 and so on. At the upper end of this group was one boy who had an intelligence quotient between 130 and 139. The median intelligence quotient of this group was 104.

With regard to the question being considered in this chapter,[2] the significant facts in these tables are: (1) the number of seniors having low intelligence quotients who plan to continue their education, particularly the number who expect to undertake four-year courses; (2) the number of seniors having high intelligence quotients who do not expect to continue their training or who are undecided; and, (3) the number of seniors having high intelligence quotients who expect to continue their training, but who are planning to attend institutions which offer less than four years of work.

For the purpose of this discussion we may consider intelligence quotients of 110 and above as being high and those below 90 as being low. On the basis of the studies of the relationship between college and intelligence, we are justified in assuming that practically all individuals with I.Q.'s of 110 and above are able to do college work successfully, whereas almost none with I. Q.'s below 90 can do so. Indeed there are not very many individuals with I. Q.'s below 100 who are able to do college work of satisfactory quality.

The number of Illinois seniors of high intelligence undecided about continuing their education or not expecting to do so amounted to approximately 7 percent of the total number (boys, 7.6 percent;

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[2]See p. 20.

TABLE II.—DISTRIBUTION OF THE COLLEGE INTENTIONS OF SENIOR BOYS IN ILLINOIS HIGH SCHOOLS WITH REFERENCE TO THEIR INTELLIGENCE QUOTIENTS

College Intentions	No. yrs.	Intelligence Quotient									
		60–	70–	80–	90–	100–	110–	120–	130–	Total	Median
Agric.....	4 yrs.		3	18	74	99	46	19	1	260	104
	less										
Comm....	4 yrs.	2	3	15	105	195	136	36	1	493	106
	less		1	8	42	49	24	9		133	103
Educ.....	4 yrs.			7	28	58	25	7		125	105
	less				2	3	3	2	1	11	112
Engin....	4 yrs.	2	8	59	220	424	309	123	13	1158	107
	less			4	21	20	16	1	1	63	103
Law.....	4 yrs.	1	4	10	38	67	55	30	5	210	108
	less					13	5	2		20	108
Lib. A....	4 yrs.			17	99	168	128	62	5	479	107
	less				1	1	2	1		5	113
Libr.....	4 yrs.										
	less										
Med.....	4 yrs.		2	22	95	112	72	20	2	325	104
	less				3	2	3	2	1	11	112
Mil. P. T..	4 yrs.			6	26	31	9	6	1	79	102
	less					1		1		2	115
Music....	4 yrs.			2	7	12	8	2		31	105
	less			1	1			1		3	95
Misc.....	4 yrs.				3	11	9	3		26	109
	less			2	11	19	4	5		41	104
Total.....	4 yrs.	5	20	156	695	1177	797	308	28	3186	106
	less		1	15	81	108	57	24	3	289	104
Undec....		1	9	71	306	367	210	60	1	1025	103
No.....			8	35	132	174	81	23	2	455	103
Grand Total...		6	38	277	1214	1826	1145	415	34	4955	105

TABLE III.—DISTRIBUTION OF THE COLLEGE INTENTIONS OF SENIOR GIRLS IN ILLINOIS HIGH SCHOOLS WITH REFERENCE TO THEIR INTELLIGENCE QUOTIENTS

College Intentions	No. yrs.	Intelligence Quotient									
		60–	70–	80–	90–	100–	110–	120–	130–	Total	Median
Agric.....	4 yrs.							1		1	125
	less										
Comm....	4 yrs.			3	13	22	16	4		58	106
	less	1	5	88	280	262	104	19		759	100
Educ.....	4 yrs.	2	11	67	268	345	210	54	7	964	104
	less	1	6	49	192	220	109	18		595	102
Engin.	4 yrs.										
	less										
Law.....	4 yrs.				2	1	3	2		8	113
	less						1			1	115
Lib. A....	4 yrs.	3	2	43	217	410	291	82	8	1056	106
	less			1	17	14	11	5		48	104
Libr.....	4 yrs.		2	1	3			1		7	92
	less				1	3				4	103
Med.....	4 yrs.				12	10	11	2	1	36	106
	less		2	21	62	72	24	4		185	101
Mil. P. T..	4 yrs.			3	7	13	5			28	103
	less			1	14	29	16	2		62	105
Music....	4 yrs.		3	16	52	88	47	8		214	104
	less		1	10	23	47	12	2		95	103
Miscl.	4 yrs.		1	1	2	12	4	1		21	105
	less			3	17	22	10	4		56	104
Total.....	4 yrs.	5	19	134	576	901	587	155	16	2393	105
	less	2	14	173	606	669	287	54		1805	102
Undec....		2	18	152	436	531	202	33	1	1375	101
No.....			14	81	260	263	151	24		793	102
Grand Total...		9	65	540	1878	2364	1227	266	17	6366	103

girls, 6.4 percent). Comparing this with the total number having intelligence quotients of 110 and above, we find that about one-fourth of the seniors having high I.Q.'s either did not expect to continue their education or had made no definite plans to do so (boys, 23.6 percent; girls, 26.6 percent). Nearly one-fourth (boys, 22.1 percent; girls, 24.0 percent) of all the seniors expecting to attend a four-year institution had I. Q.'s between 90 and 100. If these figures are compared with the total number having intelligence quotients below 90 and from 90 to 100, respectively, we find that almost three-fifths (boys 61.4 percent; girls 56.5 percent) of the former group and slightly more than three-fifths (boys, 63.9 percent; girls, 62.9 percent) of the latter group were definitely planning to obtain a higher education.

Tables II and III also show that there are a considerable number of seniors, particularly of girls, of high intelligence who were planning to attend institutions offering less than four years of work. This is true of 6.9 percent of the total number of boys and of 31.0 percent of the girls.

Distribution of Illinois seniors with reference to higher institutions. The distribution of seniors with reference to the types of higher institutions which they expected to attend is interesting, but less significant, for the purpose of the problem being considered. With few exceptions, the groups of those expecting to pursue four-year courses had higher median I. Q.'s than those who planned to pursue shorter courses. The exceptions were probably due to the unreliability of the medians of small groups. Considering all the seniors expecting to continue their educational training, those who planned to pursue four-year courses possessed a slightly higher degree of intelligence on the whole than those who were planning shorter courses. It is also noticeable that there was a slight tendency for the seniors having high I. Q.'s to choose professions such as engineering, law, and medicine, which are generally thought to require a high degree of intellectual ability for success. The lowest median I. Q.'s of groups of boys numbering more than fifty were: 103 for those in commerce, 103 for engineering, and 102 for military and physical training; for the girls, they were: education 102, medicine 101, and commerce 100. With the single exception of the boys in military and physical training, all of these low I. Q.'s were for groups of seniors planning to take less than four years of training. The highest median I. Q.'s for groups of boys numbering more than

fifty were: 108 for law, 107 for engineering, and 107 for liberal arts; those for girls were: commerce 106, liberal arts 106, and military and physical training 105. Except in the case of the one mentioned last, all of these were groups expecting to take four years or more of further training.

Limitations of the Illinois data. As has already been pointed out in Chapter II, the data summarized in Tables II and III cannot be considered highly accurate. The scores made on the Otis Self-Administering Test of Mental Ability, Higher Examination, Form A, from which the Illinois I. Q.'s were computed, are subject to variable errors. Indeed, these errors are probably somewhat greater than those which result from the application of many of the group intelligence tests, because this test is comparatively short. The probability of errors in the I. Q.'s is increased by the method of calculation recommended by Otis, and followed in this case. According to this method, no person sixteen years of age can possibly earn an I. Q. higher than 136, no one of fifteen, higher than 139, and no one of fourteen, higher than 143. Since we know from numerous other studies that, according to both individual and group tests of intelligence, the I. Q.'s of some high-school seniors are well above 140, it is evident that the method prescribed by Otis has resulted undoubtedly in reducing the I. Q.'s of very superior seniors. In other words, a constant negative error has been introduced into a number of the intelligence quotients. Still another limitation of the data used is that it is unlikely that all, or even almost all, of the high-school seniors will carry out their expressed intentions relative to higher education.

Probable future waste of human intelligence among the Illinois high-school seniors. In forming a judgment with reference to the probable degree of future waste of human intelligence, it is necessary to bear in mind, in addition to the limitations just cited, the fact that we do not possess information relative to health, interests, temperament, and other factors which condition success both in advanced training and in occupational activities. However, in the opinion of the writer, the evidence already presented indicates that the waste is great enough to warrant more explicit attention to educational and vocational guidance. It is apparent that a considerable proportion of the seniors of high intelligence will probably not be trained so that they will render maximum service to society. Although this waste

is greater than that resulting from the attempts of students of low intelligence to carry courses of training that are too difficult for them, the latter also is a source of waste that should not be neglected.

It should, however, be noted that the facts presented show that the proportion of seniors of high intelligence expecting to pursue advanced training is somewhat greater than the proportion of those of low intelligence. This condition may be the result of such educational and vocational guidance as now prevails, or of some other cause, but the fact remains that the amount of waste is somewhat less than would be the case if going to college were purely a matter of chance.

Relationship between college intentions and intelligence of Indiana, North Carolina, and Massachusetts high-school seniors. The data from these three states were not classified under the same headings, nor tabulated in the same way, as those obtained in Illinois, so that they cannot be presented in tables similar to II and III. They are, however, given in such form that they furnish assistance in dealing with the problem at issue. According to the classification used by Book in the Indiana study, it appears that 17 percent of the seniors who were planning not to attend college possessed intelligence high enough to permit little doubt of their being able to do successful work. On the other hand, 26 percent of those expecting to attend college made such low scores on the intelligence test that it is very unlikely they could do satisfactory work. Stating the facts in a different way, about one-fourth of those of high intelligence did not expect to go to college, whereas about two-thirds of those of low intelligence expected to do so.

Since in the North Carolina study, critical points that separate those seniors of high, average, and low intelligence are not indicated, and since the scores were not turned into I. Q.'s, the data obtained cannot be handled in quite the same way as those from Illinois and Indiana. If, however, we consider that those in the highest quartile of the whole distribution possessed high intelligence, and those in the lowest quartile low intelligence, the following statements may be made: about 17 percent of those in the highest quartile either were planning not to attend college or were undecided, and about 54 percent of those in the lowest quartile were planning to attend college. Stating it the other way, about 13 percent of those who were undecided or planning not to continue their training were in the

highest quartile, whereas about 20 percent of those who planned to go to college were in the lowest quartile.

In the Massachusetts study, Colvin and MacPhail classified the high-school seniors on the basis of their intelligence test scores as to their probable success in college. According to their criterion, 15 percent of those who planned not to continue their education were good college risks.

Distribution of Indiana, North Carolina, and Massachusetts seniors with reference to higher institutions. In these three states, no classification of higher institutions on the basis of length of courses was made. Those upon the basis of type of work offered differ among themselves and also from that used in the Illinois investigation. On the whole, however, the results tend to agree with those obtained in Illinois. The intelligence of those seniors who intended to take training preparing them for the so-called higher professions was in general somewhat above that of the remainder. Similarly, in so far as it can be determined from the classifications used, there was a fair degree of agreement as to the groups which ranked lowest in average intelligence.

Probable future waste of human intelligence among Indiana, North Carolina, and Massachusetts high-school seniors. In considering the data from these three states, it should be borne in mind that, except for the errors in some of the Illinois I. Q.'s, caused by Otis' method of computation, the data from these states are subject to the same limitations as those from Illinois. Their general trend is in close accord with that of the Illinois data, and tends to support the conclusions already advanced. It is apparent that, in these states as well as in Illinois, many high-school seniors of superior intelligence are not planning to secure suitable training, and that many of inferior intelligence are planning to secure more training than will be profitable. It is likewise true that the average intelligence of those who expect to go to college is higher than that of those who do not expect to do so, so that the amount of waste is not as great as it might be. It is, however, great enough to justify serious efforts to reduce it.

Waste due to maladjustment between supply and social need for trained workers. In the absence of an explicit determination of the future social needs for trained workers in the various occupational fields and other necessary information, it is not possible to determine the amount of maladjustment between the supply of, and

the demand for, workers, even if we assume that every high-school senior who supplied information carries out his intentions with reference to higher education. Since the relationship between the supply of workers and occupational positions is closer than that between the supply and college intentions, this question will be dealt with very briefly here, but at somewhat more length in the succeeding chapter. A glance at the totals columns of Tables II and III, however, makes it evident that the proportions of seniors planning to secure training of various sorts are not in agreement with the future demands of society. The most outstanding instance of this is in the case of engineering. About one-third of all the boys who intended going to college planned to take engineering courses. There can be little doubt that this is a much larger proportion than should undertake this sort of work. Likewise, the proportions of boys specifying law and medicine, and of girls specifying education, are probably too large, although one cannot be sure that serious waste will result here.

Without going into detail, it may be said that the data from the other states are, on this point, in general agreement with those from Illinois. The proportion of boys expecting to take engineering courses was in all cases very large. The agreement in the case of boys planning to take legal and medical training and of girls to take teachers' training, is not so marked.

Summary. The evidence presented in this chapter may be summarized briefly as follows: In the four states from which data were obtained, and, therefore, probably in most of our states, (1) there are many seniors with low intelligence quotients who plan to secure collegiate training; (2) there are also many seniors of high intelligence who do not expect to secure the training most profitable for them; and (3) the proportions of seniors intending to take training of various sorts do not agree with the probable future needs for trained workers. Although the waste resulting from these sources is somewhat less than it might be, it is, nevertheless, great enough to indicate that more attention should be given to educational and vocational guidance, as probably the best mediums of reducing its amount.

A few general suggestions concerning educational guidance. The writer does not purpose to attempt to formulate a detailed plan of educational and vocational[3] guidance for use in high schools,

[3]In the next chapter, there will be a brief discussion of vocational guidance.

although he does wish to state that he believes that all high schools should have a system of educational guidance. All students should be given one or more intelligence tests. Upon the basis of the results from these tests, their school records, the judgments of their teachers, and all other data that are pertinent, they should be advised concerning their future educational plans. All of those who appear able to do satisfactory college work should be strongly advised to continue their training. The system of giving this advice should be well organized and complete, so that not merely some one adviser, but all the teachers with whom each student has any considerable contact, should discuss the matter with him and offer him substantially the same advice. In many cases, the matter should also be discussed with his parents. In short, strong pressure should be brought to bear to convince all those concerned that every high-school senior who can profit by further educational training, should receive it.

CHAPTER IV

THE VOCATIONAL CHOICES OF HIGH-SCHOOL SENIORS

The problem of this chapter. In this chapter, we are concerned with vocational choices instead of intentions as to higher education. The first question to be answered is, "How much waste results from the lack of agreement between the distribution of the vocational choices of high-school seniors and the probable needs of society for workers?" The second question to be considered is, "How great is the waste of human intelligence that results: (1) because some seniors of superior intelligence plan to enter vocations which will not afford opportunity for society to receive maximum occupational returns from their intelligence; and (2) because some seniors of inferior intelligence plan to enter vocations which require for success so high a degree of intelligence that they will, in all probability, be complete or partial failures therein?"

Plan of assembling data obtained in the Illinois study. In the Illinois study, fewer answers were received to the question concerning vocational choices than to any other of those asked. Of the more than 12,000 seniors included, only about 7,000 answered this question definitely; approximately 1,500 stated that they were undecided; and about 3,500 gave no answer at all. In this connection, it is worth mentioning that almost 65 percent of the girls gave definite answers, whereas less than 55 percent of the boys did so. Probably most of those who did not answer should be classed with the undecided group, although some of them may not have named their chosen occupations because they were more or less ashamed to do so, the occupations not ranking very high in public esteem.

The vocational choices given by the seniors[1] were classified under headings similar to those used in the federal census report on occupations. They differ in that all laborers were grouped together, rather than according to the kind of work, and that only four or five

[1]Some 125 different vocations were mentioned by the seniors.

TABLE IV.—PERCENTS OF VOCATIONAL CHOICES OF ILLINOIS HIGH-SCHOOL SENIORS, BY SEXES[a]

Vocational Choice	Boys	Girls	Both
Clerical Work	3.7	23.9	15.9
Engineering	30.4	.4	12.4
Farming and Forestry	9.6	.1	3.9
Law	6.8	.2	2.9
Medicine	7.1	5.7	6.3
Philanthropic Work	.9	.7	.7
Public Entertainment	1.4	2.9	2.3
Publicity	3.6	1.4	2.2
Skilled Manuf. and Mech. Work	5.2	.2	2.2
Skilled Transportation Work	1.5	.1	.6
Teaching	9.8	58.9	39.2
Trade	16.7	3.6	8.8
Miscellaneous Professions	2.7	1.6	2.1
Miscellaneous	.7	.4	.5

[a] In this, and also in Tables V, VI, and VII, those who were undecided or did not answer are not included.

of the more common professions were listed separately, the others being grouped together. The groups used were as follows:

Clerical work
Engineering
Farming and forestry
Law
Medicine
Philanthropic work
Public entertainment
Publicity
Skilled manufacturing and mechanical work
Skilled transportation work
Teaching
Trade
Miscellaneous professions
Miscellaneous

The vocational choices of Illinois high-school seniors. Figure 1 presents the percents of Illinois senior boys and girls indicating the various vocational preferences and includes only the seniors who gave definite answers, (about 7,000). In the figure, the boys are represented by the black surfaces, the girls by the white ones. Table IV presents the same data with an additional column showing the percents of both. It will be seen that, of the boys who made definite choices, almost one-third named engineering, one-sixth trade, one-tenth teaching, and another tenth farming and forestry. Almost three-fifths of the girls chose teaching, and almost one-fourth clerical work. Although at least a few of each sex were included in every

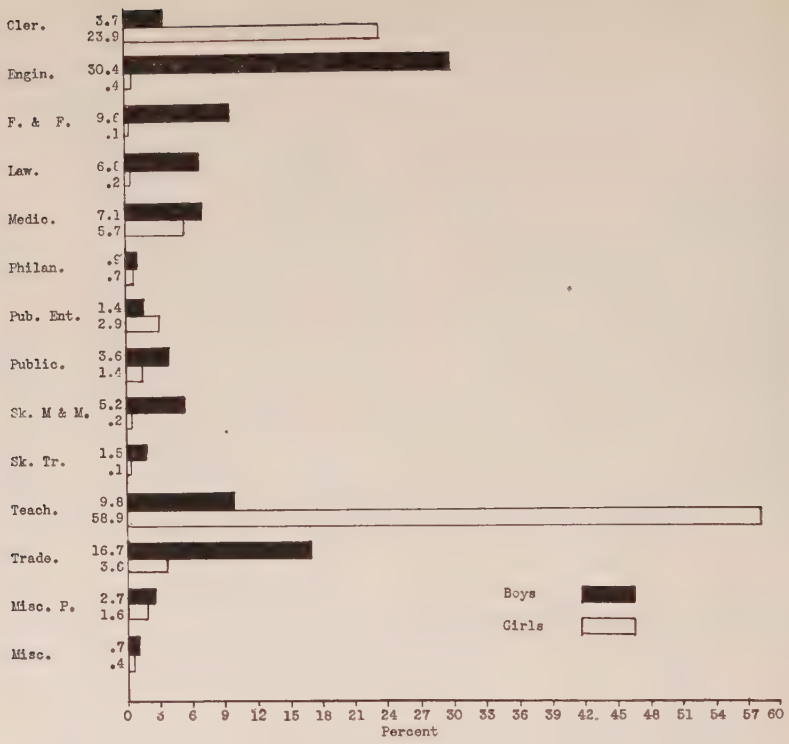

FIGURE 1. PERCENTS OF ILLINOIS BOYS AND GIRLS MAKING VARIOUS VOCATIONAL CHOICES.*

*This figure includes only those seniors who made definite vocational choices.

vocational group, the percents of girls in half the groups were less than one, whereas the percents of boys were less in only two cases.

Vocational choices of the seniors who gave no definite answers. In connection with the distribution of seniors in the various groups, some consideration should be given to the probable vocational choices of the 5,000 seniors who either were undecided or did not answer. The writer believes the assumption justified that a large proportion of those seniors will enter vocations requiring little specific training. For such vocations as engineering and medicine, it is necessary to pursue a rather definite and long course of training after high-school graduation. This necessitates an earlier vocational decision than is necessary to enter an occupation requiring little or no specific training. The one noteworthy exception is that a rather

TABLE V.—PERCENTS OF VOCATIONAL CHOICES OF INDIANA HIGH-SCHOOL SENIORS, BY SEXES

Vocational Choice	Boys	Girls	Both
Physicians	3.7	1.9	2.6
Teachers	5.4	47.0	29.7
Lawyers	5.0	1.4	2.9
Scientists	3.0	.1	1.3
Engineers	31.3	.2	13.2
Business	11.0	.0	4.6
Journalists	1.2	.9	1.0
Clerical Workers	.7	33.6	19.9
Skilled Mechanics	13.2	.2	5.5
Entertainers	.3	.8	.6
Social Workers	.2	1.1	.8
Musicians	.4	6.7	4.0
Farmers	23.7	.4	10.1
Minister	.9	.0	.4
Nurses	.0	5.2	3.0
Home Makers	.0	.5	.3

large group of seniors who were planning to carry liberal arts courses did not name any vocations. A liberal arts course gives most, if not all of the preparation required for teaching, and is also frequently pursued as a preliminary to various professional courses. With the exception of this group, the writer believes that the large majority of those who gave no definite answer will enter some one of the following half-dozen occupational groups in which the workers usually have little or no special training: clerical work, farming, skilled manufacturing and mechanical work, skilled transportation work, trade, and miscellaneous.[2]

Vocational choices of Indiana, North Carolina, and Massachusetts high-school seniors. Although the classifications of vocational choices made in the other studies are not just the same as that used in the Illinois investigation, they resemble it sufficiently to afford more or less comparable data. In considering the data from the other three states, only those for the seniors who made definite choices will be included in Tables V, VI, and VII, and discussed in the text.[3]

[2]The miscellaneous group was composed largely of laborers and servants.

[3]Definite vocational choices were not given by 46.9 percent of the North Carolina seniors, 38.3 percent of the Indiana seniors, and about 20 percent of the Massachusetts seniors.

TABLE VI.—PERCENTS OF VOCATIONAL CHOICES OF NORTH CAROLINA HIGH-SCHOOL SENIORS

Vocational Choice	Both
Arts	6.4
Medicine	10.3
Business	3.7
Religious	4.7
Engineering	10.3
Law	4.9
Teaching	28.0
Music	6.1
Commercial	17.2
Physical Directorship	3.4
Nursing	1.7
Mechanics	1.2
Miscellaneous	2.0

TABLE VII.—PERCENTS OF VOCATIONAL CHOICES OF MASSACHUSETTS HIGH-SCHOOL SENIORS, BY SEXES

Vocational Choice	Boys	Girls	Both
Professional	50	45	47
Clerical Workers	11	45	32
Skilled Artisan	16	5	8
Foreman and Business Executive	9	1	4
Salesman and Clerk	10	0	4
Home Making	0	4	3
Farmers	4	0	2

Table V presents the figures for the Indiana seniors. It will be seen that the percent of boys intending to take engineering is approximately the same as in the case of Illinois, being nearly one-third of those who stated definite choices. Likewise, the number of girls planning to teach is very large, being almost one-half of the girls. It is noteworthy that a much larger proportion of the Indiana boys expected to become skilled mechanics and farmers than was true in any other investigation. Because of this, the distribution of senior boys in Indiana will probably approximate the needs of society more nearly than in the other states from which data are available. Among the girls, the number of clerical workers was large, being about one-third of those making definite choices. It is not certain, however,

that there will not be a place for such a large proportion in the business world. Probably more girls were planning to become musicians and nurses than will be needed.

Table VI gives the percents of North Carolina seniors making various vocational choices. It will be seen that, on the whole, these tend to agree with the corresponding data for the Illinois and Indiana seniors. Since they are not given by sexes, the comparison cannot be made exactly. It is evident, however, that more North Carolina seniors intended to enter medicine, engineering, and teaching, than will be needed to supply the social demand. The commercial group also is large.

The data for Massachusetts, which are given in Table VII, are not so grouped that one can determine the proportion of boys who intend to be engineers. The whole professional group, however, contains one-half of all those making definite choices, which is too many. Except for this, it is not apparent that any of the groups named contains too great a proportion of boys. The professional and clerical groups each contain 45 percent of the girls, which is undoubtedly too large a proportion.

Difficulties in the way of determining the proportions of seniors which should enter each occupation. There are no data available which show just what the needs of society are at present or, still more important, what they will be in the future. Neither does any one know just what part of all those engaged in any occupation should come from the ranks of high-school graduates. We know approximately how many individuals are engaged in each occupation at present, but we do not know how nearly these numbers approach those best suited to the needs of society, nor how such needs will change. One hears it said, for example, that we have more lawyers than we need, and that we do not have enough farmers, but these are mere statements of opinion and, even if accepted as true, do not supply numerical data as to how many lawyers or farmers are needed. We know, also, that the number of workers in certain vocations is decreasing and in others increasing. It appears that these tendencies probably will continue for a considerable time in the future, but we cannot be sure that this will occur. The proportions of workers in other lines of work have been fairly constant for a long period and are likely to remain so. Again, however, we cannot be sure that this will follow. We know, too, that there are many vocations which cannot be entered without at least a high-school educa-

tion. The present tendency appears to be to increase the number of such vocations but we cannot be sure that this will continue in the future.

Another point that should be considered in this connection is whether or not it is desirable that the proportion of seniors entering a given occupation should be no greater than the number of persons who should be engaged therein to meet society's needs. It may be that it is desirable to have more persons entering many, if not all, of the occupations which require a considerable amount of ability and training, or in which the workers perform services of value to society. An argument to support this view is that such a condition makes competition keener and that this may result in better services being rendered. Furthermore, the fact that more persons than are needed enter an occupation probably results in the elimination of a number of those least fitted for that line of work. Although the writer has mentioned this point of view as one that deserves consideration, he does not believe that it justifies the entrance into any vocation of very many more than the required proportion. Even though it is not necessary to put forth one's best efforts to remain in a given vocation, it will always be necessary to do so in order to attain high standing and large material rewards, and this spur to competition, in his opinion, will be sufficient.

The agreement between vocational choices and the future needs of society. Although there is no satisfactory criterion available with which the proportions of seniors making various vocational choices may be compared in order to determine how well social needs will be met, some tentative conclusions upon the subject can be drawn. Table VIII presents a comparison of the percents of Illinois seniors with the percents of the total employed population of the United States in each occupational group. The census figures are from the 1920 census and include all employed persons eighteen or more years of age. Those from ten to seventeen years of age, inclusive, were eliminated because comparatively few high-school seniors are graduated and enter vocations until after they are seventeen. Perhaps the most outstanding fact shown by Table VIII is that, as a general rule, the proportions of high-school seniors choosing the "white collar" occupations are much greater than the proportions of all employed persons engaged therein, and, conversely, that the proportions of seniors choosing occupations requiring manual labor are comparatively small in comparison with the proportions already

TABLE VIII.—PERCENTS OF ILLINOIS HIGH-SCHOOL SENIORS CHOOSING VARIOUS OCCUPATIONS COMPARED WITH PERCENTS OF ALL PERSONS OVER 18 YEARS OF AGE ENGAGED THEREIN ACCORDING TO THE 1920 CENSUS

Occupation	Boys		Girls	
	Seniors	Census	Seniors	Census
Clerical Work	3.7	4.3	23.9	14.7
Engineering	30.4	.7	.4	.1
Farming and Forestry	9.6	28.8	.1	10.7
Law	6.8	.4	.2	.02
Medicine	7.1	.7	5.7	2.3
Philanthropic Work	.9	.5	.7	.5
Public Entertainment	1.4	.3	2.9	.8
Publicity	3.6	.1	1.4	.1
Skilled Manuf. and Mech. Work	5.2	25.0	.2	19.6
Skilled Transportation Work	1.5	6.8	.1	2.3
Teaching	9.8	.6	58.9	9.0
Trade	16.7	10.9	3.6	10.0
Miscellaneous Professions	2.7	.3	1.6	.5
Miscellaneous	.7	20.6	.4	29.4

employed in such occupations. On the whole, there is no agreement between the percents choosing the various occupations and those already engaged in them. The coefficient of correlation is practically zero. Similar tables are not presented for the other states, as they would merely furnish further evidence of the same kind.

It is impossible to state the amount of waste resulting from the maladjustment of vocational choices to the needs of society in even approximately exact quantitative terms, but the evidence previously presented seems, to the writer, sufficient to justify the statement that the amount of such waste is relatively great. Certainly at least one-fourth, and perhaps as many as one-half, of our high-school seniors will find it necessary to alter their vocational plans if the proportions engaged in various occupations are anything like those which fit society's needs. It is possible to object to this statement on the ground that, although the vocational choices of our workers should agree approximately with the demands of society, those of high-school seniors should not, or at least need not, do so. This implies that many of our workers will not be high-school graduates, and that from the ranks of these non-graduates will come most of our unskilled workers. Although the writer admits that this is true to a

TABLE IX.—DISTRIBUTION OF THE VOCATIONAL CHOICES OF SENIOR BOYS IN ILLINOIS HIGH SCHOOLS WITH REFERENCE TO THEIR INTELLIGENCE QUOTIENTS

Vocational Choice	Intelligence Quotient									
	60–	70–	80–	90–	100–	110–	120–	130–	Total	Median
Clerical Work		1	8	37	34	20	8		108	102
Engineering		5	36	155	309	255	99	9	868	108
Farming and Forestry		3	16	73	100	56	16	2	266	104
Law	1	3	5	33	60	53	31	4	190	109
Medicine		1	8	54	67	48	10	1	189	105
Philanthropic Work			1	6	5	7	6		25	111
Public Entertainment			2	11	13	10	2		38	105
Publicity			3	10	47	32	8		100	108
Skilled Manuf. and Mech. Work		1	6	40	59	35	10	6	157	105
Skilled Trans. Work			1	10	18	10	4		43	106
Teaching			18	80	107	54	17	1	277	104
Trade		1	22	104	170	120	45		462	106
Miscellaneous Professions			3	10	36	15	10		74	107
Miscellaneous			1	5	10		2	3	21	105
Total Making Choice	1	15	130	628	1035	715	268	26	2818	106
Undecided	1	8	42	208	257	192	70	1	779	105
Total Answering	2	23	172	836	1292	907	338	27	3597	106
Not Answering	5	19	126	467	638	333	101	4	1693	104
Grand Total	7	42	298	1303	1930	1240	439	31	5290	105

very limited extent, he does not believe that such a condition should obtain for any large proportion of our young people. He believes that it should be one of the fundamental ideals of our democratic system of education that every young person who can profit thereby should receive a high-school education and, furthermore, that the high-school education offered should be of such a sort that the large majority of our young people can profit by receiving it.

Relationship between the vocational choices and intelligence of Illinois high-school seniors. Tables IX and X present summaries of the facts relative to the vocational choices and the intelligence of the senior boys and girls of Illinois high schools. For example, the first line of Table IX shows that there was one senior boy planning to

TABLE X.—DISTRIBUTION OF THE VOCATIONAL CHOICES OF SENIOR GIRLS IN ILLINOIS HIGH SCHOOLS WITH REFERENCE TO THEIR INTELLIGENCE QUOTIENTS

Vocational Choice	Intelligence Quotient									
	60–	70–	80–	90–	100–	110–	120–	130–	Total	Median
Clerical Work	1	5	82	345	401	146	30	3	1013	102
Engineering				3	4	4	2		13	109
Farming and Forestry					1	2			3	113
Law				2	1	3	4		10	117
Medicine		2	19	86	88	42	6	1	244	102
Philanthropic Work				6	11	8	2	1	28	107
Public Entertainment		1	8	18	58	30	8		123	106
Publicity			1	6	27	18	9		61	109
Skilled Manuf. and Mech. Work				4	3	1	1		9	102
Skilled Trans. Work					3			1	4	107
Teaching	3	23	149	676	933	541	126	7	2458	104
Trade		2	17	30	69	34	1		153	104
Miscellaneous Professions		2	3	18	23	20	2		68	105
Miscellaneous			1	6	4	2	1		14	100
Total Making Choice	4	35	280	1200	1626	851	192	13	4201	104
Undecided	3	7	66	193	286	129	26	2	712	103
Total Answering	7	42	346	1393	1912	980	218	15	4913	103
Not Answering	3	28	216	547	631	260	38	2	1725	101
Grand Total	10	70	562	1940	2543	1240	256	17	6638	103

enter clerical work who had an I. Q. of from 70 to 79, eight with I.Q.'s of from 80 to 89, and so on to eight with I.Q.'s between 120 and 129. There were 108 boys in this group, and their median I.Q. was 102.

Figure 2 presents in graphical form a portion of the same data. In it are shown the middle fifty percent, according to intelligence quotients, of the Illinois boys and girls in each vocational group. The hatched surfaces represent the boys, the plain ones the girls. The figure shows, for example, that the middle fifty percent of the boys choosing law had I.Q.'s between about 101 and 118, with a median of approximately 109.

With regard to the second question raised at the beginning of this chapter, the significant facts in these tables are: (1) the number

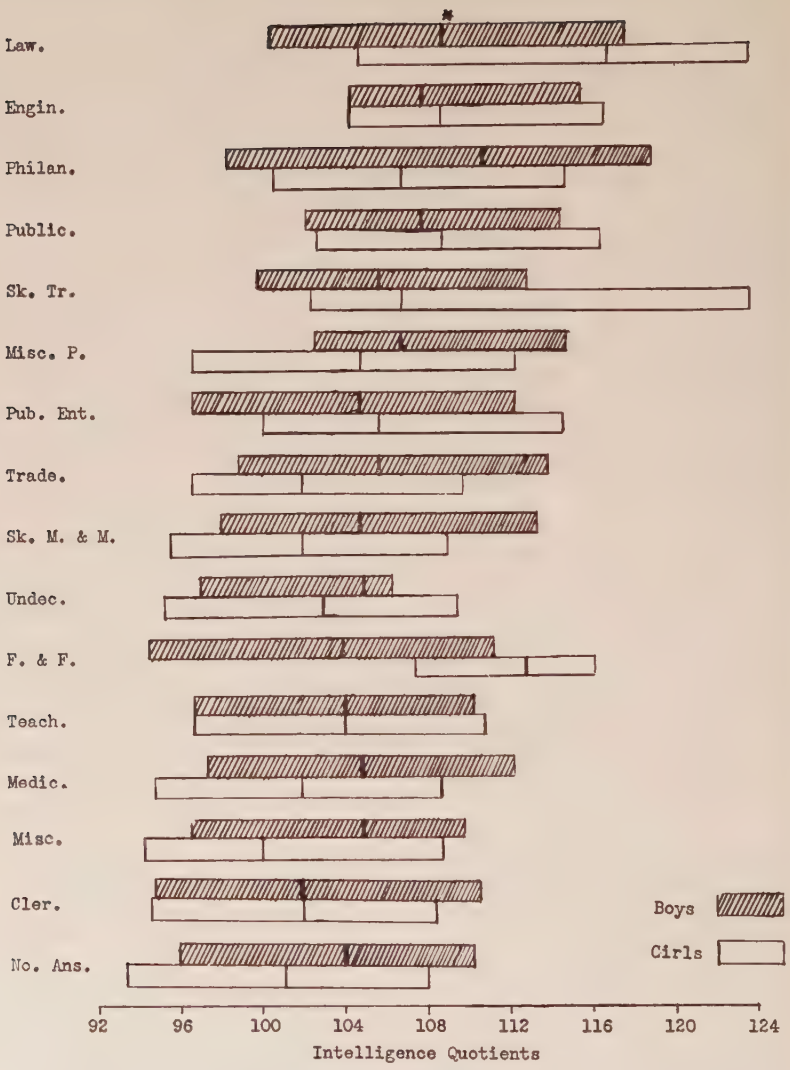

FIGURE 2. RANGE OF INTELLIGENCE QUOTIENTS OF THE MIDDLE FIFTY PERCENTS OF ILLINOIS SENIOR BOYS AND GIRLS, ACCORDING TO VOCATIONAL CHOICES.*
*The short perpendicular lines in the bars represent the medians.

of seniors having low intelligence quotients who planned to enter vocations requiring a high degree of intellectual ability; and (2) the number of seniors of high intelligence planning to enter vocations that do not require as much intellectual ability as these seniors possess. Before these facts can be known, there must be some determination of the degree of intelligence required for success in each occupation or occupational group. This question has received considerable attention in recent educational writings. No valid evidence that covers any considerable portion of the field has been presented, however. The assertion has been made, and fairly well supported, that a person must have an I.Q. of 110 or 115 in order to be successful in most of the professions; than an I.Q. of 80 or 85 is as high as is required for an efficient street car motorman; and so on. Even if such assertions are accepted as reliable, they have very limited value at present. One reason is that they apply, in general, to large groups of vocations. In only a few cases have such determinations been made for single, narrowly defined occupations. A second important limitation of their use is the difficulty of measuring intelligence with a sufficiently high degree of accuracy and reliability. Certainly a single application of any group intelligence test now in existence does not yield a satisfactory measure. In spite of these limitations, it is possible to make certain general statements with some assurance. There seems little doubt that all occupations may be thrown into a few large groups and the statement made that a certain I. Q. is sufficient to enable one to succeed fairly well in each class. It must be recognized that the limits between classes cannot be definitely fixed and that there will be many individual exceptions.

Statements much stronger and more definite than those just made have been put forth by some writers on the basis of the army test data. Although, in most cases, the samplings on which these results are based are large enough to render them fairly reliable, great caution should be exercised in their use for the purpose of determining the levels of intelligence required for success in various occupations. It is true that there is a tendency for individuals to find work suited to their capacities, but we have no right to assume that all, or even a decided majority, of those at present engaged in most lines of work have just the degree of intelligence which best fits them for such work. Neither do we have any knowledge concerning the number of the army recruits claiming to be engaged in certain occupations who were successful therein. For the sake of comparison,

TABLE XI.—THE INTELLIGENCE OF ILLINOIS HIGH-SCHOOL SENIOR BOYS COMPARED WITH THAT OF ARMY RECRUITS ACCORDING TO OCCUPATIONAL GROUPS

Occupational Groups	Median I. Q. of Senior Boys	Median Letter Grade of Recruits
Philanthropic Workers	111	A
Engineers	108	B
Skilled Trans. Employees	106	C
Medical Workers	105	B
Skilled Manuf. and Mech. Workers	105	C
Farmers and Foresters	104	C−
Clerical Workers	102	C+

however, Table XI presents the median I.Q.'s of the senior boys whose choice fell in seven[4] of the occupational groups used in this study along with the median letter grades of army recruits who stated that they belonged in these groups.

It will be seen that there is a marked tendency for the medians obtained in this study to agree with those for the army. The philanthropic workers rank high in both; the engineers second in one, and tied for second in the others; the farmers and foresters are lowest in the army findings, and next to lowest among the senior boys. The rank coefficient of correlation between the two sets of medians is about .60.

It is easily seen by glancing at Tables IX and X and at Figure 2 that a large proportion of the seniors of inferior mental ability planned to enter vocations requiring a high degree of intelligence and also that many of those mentally superior planned to enter vocations in which high intelligence is not necessary to success. For example, almost one-fourth of the boys who chose engineering, one-third of those who chose medicine, over one-third of those who chose teaching, and over one-sixth of those who chose miscellaneous professions, had I.Q.'s below 100. On the other hand, more than one-fourth of the boys who were planning to be clerical workers, the same fraction of those planning to enter farming and forestry, and almost one-third of those planning to enter skilled manufacturing and mechanical work had I.Q.'s of 110 or higher. Similar figures could be quoted for the girls also. It is true that there is a tendency for the

[4]In the case of the other groups no comparable figures for the army recruits are available.

TABLE XII.—DISTRIBUTION OF THE VOCATIONAL CHOICES OF NORTH CAROLINA HIGH-SCHOOL SENIORS WITH REFERENCE TO THEIR INTELLIGENCE TEST SCORES

Vocational Choice	Intelligence Quotient										
	60–	70–	80–	90–	100–	110–	120–	130–	140–	Total	Median
Arts			1	3	4	3	9	4	2	26	122
Medical			1	3	9	12	11	6		42	117
Business			1	3	2	3	4	2		15	115
Religious				3	5	6	4		1	19	113
Engineering			1	4	13	12	7	4	1	42	112
Law		1		2	7	3	5	2		20	110
Teaching	2	6	4	22	33	26	17	2	2	114	107
Music			3	5	5	5	6	1		25	109
Commercial		1	5	10	25	21	5	3		70	108
Physical Directorship			1	3	4	3	3			14	108
Nursing				3	1	2	1			7	105
Mechanics			1	2		2				5	98
Miscellaneous						2	3	3		8	126
Total making choice	2	8	18	63	108	100	75	27	6	407	110
Undecided	4	10	19	71	84	95	50	22	4	359	109
Grand Total	6	18	37	134	192	195	125	49	10	766	110

median I.Q.'s to be higher in the occupational groups requiring the highest intelligence and lowest in those requiring the least, but the differences between the medians are comparatively small and the overlapping of the distributions so great that one is justified in saying that the relationship between intelligence and vocational choices is small. It seems evident, therefore, that a considerable amount of waste results from the entrance of persons of low intelligence into occupations too difficult for them, and of those of high intelligence into occupations in which they cannot make use of all of their mental ability.

The relationship between the vocational choices and intelligence of North Carolina, Indiana, and Massachusetts seniors. The reports of the studies in the last two of these states do not give the distributions of scores, but in that of the North Carolina investigation they are included, and are presented in Table XII. One can easily see

TABLE XIII.—PERCENTS OF INDIANA SENIOR BOYS AND GIRLS OF HIGH AND LOW INTELLIGENCE IN EACH OCCUPATIONAL GROUP

Occupational Group	Boys		Girls	
	High	Low	High	Low
Journalist	44	13	44	18
Minister	42	16		
Scientist	41	13		
Teacher	33	13	24	26
Lawyer	32	4	38	16
Clerical Worker	30	16		
Engineer	30	19		
Business	23	27		
Skilled Mechanic	18	33		
Farmer	16	33		
Physician	12	29	19	31
Social Service			31	27
Entertainer			25	18
Home Maker			20	21
Nurse			18	32
Stenographer			16	29
Music and Art			16	28

from this table that much the same conditions existed as were shown in Illinois. In almost all the occupational groups the range of intelligence was great. The various professions were chosen by a fairly large proportion of individuals of such low intelligence that they have little chance of succeeding in their chosen occupations, whereas in some of the other groups there were a number possessing intelligence higher than necessary for success therein.

Table XIII presents the data for the Indiana seniors in a form which is different from that used in Tables IX, X, and XII, but which, nevertheless, shows that the same conditions existed in Indiana as in Illinois and North Carolina. For example, 29 percent of the boys and 21 percent of the girls planning to become physicians possessed low intelligence. Similarly, 19 percent of the boys planning to become engineers, 13 percent of those planning to become scientists, and various percents of the other groups were rated as of low intelligence. On the other hand, 30 percent of the boys in the clerical group and 18 percent of those in the skilled mechanics group had a high degree of intelligence.

TABLE XIV.—MEDIAN POINT SCORES OF THE MASSACHUSETTS SENIOR BOYS AND GIRLS IN EACH OCCUPATIONAL GROUP

Occupational Group	Boys	Girls
Professional	55	44
Clerical Workers	47	41
Skilled Artisans	46	44
Foreman and Business Executive	46	50
Salesmen and Clerks	48	
Homemaking		43
Farmers	48	

These figures make it evident that in Indiana also there is a considerable amount of waste due to lack of agreement between intelligence and vocational choices.

The only data available for Massachusetts which bear upon this point are the median scores of those in the different occupational groups. These are given in Table XIV. They show that, on the whole, the boys in the professional group and the girls in the foreman and business executive group ranked high, whereas the boys in the latter group and also in the skilled artisan group, and the girls who are to be clerical workers, ranked low. We cannot obtain from them any estimate of the proportion of seniors choosing vocations that are too difficult or too easy for their intelligence.

The relationship between the vocational choices and the average school marks of Illinois seniors. The average school marks of the Illinois seniors were tabulated by vocational groups in the hope that they might afford some evidence useful in the solution of the problem being studied. These are given in Tables XV and XVI. They indicate the same condition as was shown by the intelligence quotients, that some of the seniors intending to enter vocations which require a comparatively high degree of intelligence made low school marks, and likewise that some of those planning to enter vocations requiring only rather a low degree of intelligence made high school marks. Therefore, in so far as school marks may be taken as measures of intelligence, these data serve to furnish further evidence that a considerable amount of waste results from the lack of agreement between the intelligence possessed by seniors and that demanded for the vocations which they plan to enter.

TABLE XV.—DISTRIBUTION OF THE VOCATIONAL CHOICES OF SENIOR BOYS IN ILLINOIS HIGH SCHOOLS WITH REFERENCE TO THEIR AVERAGE SCHOOL MARKS[a]

Vocational Choice	Average School Mark								
	E[b]	D[b]	C−	C	B	A	A+	Total	Median
Clerical Work			2	13	17	2	1	35	B−
Engineering	1	2	19	63	96	43	7	231	B−
Farming and Forestry		2	7	18	34	6	1	68	B−
Law		1	3	13	14	4	2	37	B−
Medicine			4	13	20	5	2	44	B−
Philanthropic Work				1	4			5	B
Public Entertainment			3	3	6	2	1	15	B−
Publicity		1		5	15	3		24	B
Skilled Manuf. and Mech. Work		1	4	11	23	2	1	42	B−
Skilled Trans. Work			2	5	9	5	1	22	B
Teaching		5	5	24	35	14	6	89	B−
Trade	1	1	12	43	48	13	4	122	B−
Miscellaneous Professions				5	13	6	2	26	B
Miscellaneous					4		1	5	B
Total Making Choice	2	13	61	217	338	105	29	765	B−
Undecided		5	27	70	94	34	7	237	B−
Total Answering	2	18	88	287	432	139	36	1002	B−
Not Answering	2	14	31	88	114	26	5	280	B−
Grand Total	4	32	119	375	546	165	41	1282	B−

[a] The meaning of these marks is as follows: A +, The very best. A, Those well above average. B, Strong average. C, Weak average. C −, Barely passing. D, Barely failing. E, Badly failing.

[b] The reader may wonder how a student could become a high-school senior with such a low average as E or D, both of which are failing marks. It appears that the few seniors with these averages, unless some error was made by the schools in reporting the marks, must have remained in school long enough to complete three years' work, even though they failed so many times that their averages were below passing. These cases were scattered among a number of schools, so evidently did not result from a misunderstanding of directions.

Summary. The question stated at the beginning of this chapter may be answered briefly as follows: it appears that from 25 to 50 percent of the high-school seniors included in the four studies dealt with will have to change their vocational plans in order to bring the number of workers in the different occupations into agreement with the needs of society. Furthermore, a rather large fraction of those planning to enter occupations that require a high degree of intelligence made such low intelligence test scores as to indicate that they

TABLE XVI.—DISTRIBUTION OF THE VOCATIONAL CHOICES OF SENIOR GIRLS IN ILLINOIS HIGH SCHOOLS WITH REFERENCE TO THEIR AVERAGE SCHOOL MARKS

Vocational Choice	Average School Mark								
	E	D	C−	C	B	A	A +	Total	Median
Clerical Work		1	14	76	122	29		242	B−
Engineering									
Farming and Forestry							1	1	A+
Law					2	2		4	A−
Medicine		1		23	18	4		46	C+
Philanthropic Work					1		2	3	A+
Public Entertainment			2	14	14	4	1	35	B−
Publicity				3	6	2	1	12	B
Skilled Manuf. and Mech. Work				1				1	C
Skilled Trans. Work									
Teaching	1	6	17	111	263	129	36	563	B
Trade				7	15	3	1	26	B
Miscellaneous Professions		1		1	3	3	1	9	B+
Miscellaneous			5	11	12	3		31	C+
Total Making Choice	1	9	38	247	456	179	43	973	B
Undecided		2	12	43	95	51	13	216	B
Total Answering	1	11	50	290	551	230	56	1189	B
Not Answering	1	9	19	65	104	31	0	229	B−
Grand Total	2	20	69	355	655	261	56	1418	B

will not succeed in their chosen vocations. Conversely, a fairly large fraction of those entering the occupations that require only a low degree of intelligence possess a high degree thereof and will not find opportunity for its maximum use in the vocations selected. On the basis of the facts known, it is practically impossible to make any quantitative statement as to how great the resulting waste is.

Service to be rendered by a system of vocational guidance. As was suggested at the end of Chapter III, the writer believes that an efficient system of vocational guidance would eliminate a large, and probably the larger, part of the waste resulting from the several causes discussed in this chapter. Such vocational guidance should look both to leading such numbers of individuals to enter the various occupations as meet the needs of society, and to influencing seniors

to choose vocations for which their intelligence fits them. Before such vocational guidance can be given with a great degree of definiteness, exhaustive investigations must be made to determine the needs of society at present and as nearly as possible, in the future, and to discover approximately the optimum degree of intelligence for each vocation. The vocational advice to be given a high-school senior or anyone else should be in something like the following form:

"You appear to have sufficient intelligence to enable you to succeed in such occupations as . . . It is very unlikely that you can succeed in . . . , since these demand a higher degree of intelligence than you possess. Furthermore, it would probably be unwise for you to enter such occupations as . . . , because they do not require the use of as much intelligence as you possess."

Further than this, the advice given an individual should be based upon the consideration of many other factors, among them being social needs, the individual's health, strength, and temperament, his past experience, interests, opportunities for finding out something concerning various vocations, etc. Although we cannot, at present, give vocational advice based on a complete knowledge of the situation, we should not hesitate to give such advice as we can along the lines indicated.

APPENDIX A

INFORMATION BLANK FOR HIGH-SCHOOL SENIORS

The following blank was used to collect the data for this study. The instructions for filling it out were on the reverse.

INFORMATION BLANK FOR HIGH-SCHOOL SENIORS

.....

Name..... Sex—Boy..... Girl.....
(check one)

Date of Birth..... Age on Sept. 1, 1923.....
(month) (day) (year)

Name of School..... Town or City.....

☞See other side for instructions.

1. Do you intend to go to school after H. S. graduation?.....

2. If so, to what institution?.....

3. Check the course you expect to take. If it is not named, write it on the blank line. If you have no idea as to what you will take, so indicate.

Agriculture..... Commerce..... Engineering.....

Law..... Music..... Medicine.....

Teacher-Training..... Liberal Arts or General

.....

4. In what subject will you major or specialize?.....

	9 Units	10 Most	11 Least	12 Failures
Agriculture				
Commercial Wk				
Domestic Sci				
English				
Hist. and Civics				
Latin				
Manual Train				
Mathematics				
Modern Foreign Language				
Music				
Science				

5. What occupation or vocation will you enter?.....

6. What is your father's occupation?.....

7. Have you ever taken an intelligence test before?.....

8. If so, when?.....

INSTRUCTIONS FOR ANSWERING QUESTIONS

The numbers below refer to the numbers of the questions.

1. This refers to any sort of schooling above high school whether college, normal school, business school, or any other. If possible it should be answered by "yes" or "no." In case you have no intention one way or the other, it should be answered "undecided."

2. If you have not definitely decided what institution you will attend but expect to attend a certain one or have a preference for one, name that institution.

3, 4, 5. The same principle applies to these questions. If you have not made a definite decision give your preference.

6. In giving father's occupation give that in which he is at present engaged. If father is dead give the last occupation at which he worked.

7. Answer by "yes" or "no." If you do not know ask the teacher.

8. Answer by giving year if possible.

9. This question is: How many semester credits or units do you expect to have in each high-school subject when you are graduated? It is to be answered by writing the proper numbers in the column headed 9. The numbers written should give the number of semester credits or units of work that you expect to have in each subject when you are graduated from high school. Ordinarily a semester unit is given for passing in a course meeting five times a week for one semester. Four such credits are usually earned per semester by the average pupil. Consider Commercial Arithmetic as commercial work, not as mathematics. If you are doubtful as to how other subjects should be classified, ask the teacher.

10. What is your favorite high-school subject? A number 1 should be written in the column headed 10 after your favorite school subject and a number 2 after your second choice.

11. What high-school subject do you like least? A number 1 should be written in the column headed 11 after the subject that you like least and a number 2 after the one which you like next to least.

12. How many times have you failed in each high-school subject? If you have failed in any subjects write the number of times after each. This should be in the column headed 12.

APPENDIX B

DIFFERENCES AMONG ILLINOIS SENIORS

Differences between the Illinois seniors coming from the different sections of the state and from schools of different sizes. As a matter of information and interest it seems well to present and discuss briefly certain differences between the seniors coming from the three different geographical sections into which Illinois was divided for the purpose of this study, and also between those coming from high schools of different sizes.

Differences in intelligence. In Table XVII will be found the distribution of I.Q.'s for the seniors from the three sections of the state and in Table XVIII for those from the five classes into which the schools were divided. From the former it appears that the median intelligence quotient of those from the northern section of the state is 105, whereas the medians for those from the other two sections of the state are both 103. It seems, therefore, that the seniors from the northern portion of the state are slightly more intelligent.

The medians for those from different sized schools show a rather marked tendency to be higher, the greater the size of the school. The highest median, 106, is for the seniors in schools of 1,000 or more and the lowest, 102, for those in schools of less than 100. The only break in the tendency for the median to increase with the size of the school is found in the case of Class III, the median of which is one greater than is the median of Class II.

Differences in college intentions. Table XIX presents the differences in college intentions according to the sections of the state from which the seniors came. On the whole there are few significant differences. The central section has larger percents of seniors intending to pursue agricultural and commercial courses and also a lower percent definitely intending not to attend college. The southern section has a markedly lower proportion of seniors expecting to take military and physical training courses. The other differences are so small that, when compared with their probable errors, they are not very reliable.

The differences in college intentions according to the size of the school vary more than those according to the section of the state. A

TABLE XVII.—INTELLIGENCE QUOTIENTS OF ILLINOIS SENIORS FROM THE DIFFERENT SECTIONS OF THE STATE

Section	Intelligence Quotient									
	60–	70–	80–	90–	100–	110–	120–	130–	Total	Median
Northern	7	34	342	1525	2307	1304	437	33	5989	105
Central	6	54	363	1105	1367	768	159	7	3829	103
Southern	4	24	155	613	799	408	99	8	2110	103
All	17	112	860	3243	4473	2480	695	48	11928	104

TABLE XVIII.—INTELLIGENCE QUOTIENTS OF ILLINOIS SENIORS FROM HIGH SCHOOLS OF DIFFERENT SIZES

Class	Intelligence Quotient									
	60–	70–	80–	90–	100–	110–	120–	130–	Total	Median
I	4	6	109	622	1047	686	237	17	2728	106
II	2	14	113	457	602	370	96	8	1662	104
III	1	14	80	315	585	338	89	9	1431	105
IV	5	45	303	1120	1386	724	198	10	3791	103
V	5	33	255	729	853	362	75	4	2316	102
All	17	112	860	3243	4473	2480	695	48	11928	104

number of rather pronounced differences may be seen by inspecting Table XX. The percents of seniors intending to take courses in law, medicine, military and physical training work tend to increase directly with the size of the school, whereas the percents of those intending to take agriculture, commerce and education do just the opposite. There was also a tendency for a greater proportion of seniors from large schools to have definite intentions not to attend college.

Differences in vocational choices. Tables XXI and XXII show the differences in vocational choices between seniors of different sections of the state and from schools of different sizes. The most

TABLE XIX.—PERCENTS OF HIGH-SCHOOL SENIORS HAVING VARIOUS COLLEGE INTENTIONS, BY SECTIONS OF THE STATE

College Intentions	Section of State			
	Northern	Central	Southern	All
Agriculture	1.9	3.0	2.1	2.3
Commerce	11.3	15.4	11.9	12.8
Education	14.1	15.7	16.2	15.0
Engineering	11.0	10.3	11.0	10.8
Law	2.5	1.8	1.9	2.1
Liberal Arts	13.7	14.5	14.0	14.1
Librarian	.1	.1	.0	.1
Medicine	5.1	4.0	6.3	4.9
Military and P. T.	1.8	1.6	.5	1.5
Music	3.1	2.7	3.3	3.1
Miscellaneous	1.4	1.1	1.3	1.3
Total	65.9	70.2	68.6	67.8
Undecided	21.6	21.2	19.8	21.2
No	12.5	8.6	11.5	11.0

notable difference between the sections of the state is that the percent of seniors from the northern section intending to teach is about ten less than from the other sections. To balance this the proportions of seniors from the northern section planning to enter publicity work, the trades and the other professions were all greater. The number in the central section who chose engineering was somewhat low and the numbers choosing farming and forestry and philanthropic work relatively high. The southern portion of the state has the smallest percents in about one-half of the occupational groups.

The size of the school, which is almost equivalent to saying the size of the community, appears to be connected with the percents of seniors choosing different vocations in about one-half of the occupational groups. The percents of those who chose clerical work, engineering, law, publicity work, trade and the miscellaneous professions very definitely tend to increase directly with the size of the school, whereas just the reverse is true for farming and forestry and teaching.

A word of explanation and comment is probably worth while concerning the large differences in the percents of those expecting

TABLE XX.—PERCENTS OF HIGH-SCHOOL SENIORS HAVING VARIOUS COLLEGE INTENTIONS BY SIZES OF SCHOOLS

College Intentions	Class					
	I	II	III	IV	V	All
Agriculture	1.1	2.4	1.6	2.9	3.0	2.3
Commerce	11.1	11.6	12.4	14.5	13.7	12.8
Education	11.8	13.7	11.5	16.5	18.7	14.9
Engineering	11.3	10.7	10.6	11.0	10.1	10.8
Law	3.6	2.4	2.1	1.6	1.1	2.1
Liberal Arts	16.2	13.3	15.5	12.8	13.4	14.1
Librarian	.1	.3	.1	.1	.0	.1
Medicine	5.8	5.8	4.7	4.6	4.1	4.9
Military and P. T.	2.0	1.9	.8	1.6	1.0	1.4
Music	2.3	3.3	2.7	2.4	3.4	3.1
Miscellaneous	1.3	2.2	1.3	1.2	.8	1.3
Total	66.7	67.5	63.4	70.0	68.2	67.8
Undecided	21.3	17.8	23.3	20.9	22.5	21.2
No	11.9	14.6	13.4	9.0	9.3	11.0

TABLE XXI.—PERCENTS OF OCCUPATIONAL CHOICES, BY SECTIONS OF THE STATE

Occupational Choice	Section of State			
	Northern	Central	Southern	All
Clerical Work	16.2	15.4	15.8	15.9
Engineering	13.4	10.6	12.9	12.3
Farming and Forestry	3.7	4.7	3.1	3.9
Law	3.4	2.2	2.6	2.9
Medicine	6.6	5.6	6.4	6.3
Philanthropic Work	.7	1.0	.5	.8
Public Entertainment	2.5	2.	2.	2.3
Publicity	3.	1.8	1.3	2.3
Skilled Manuf. and Mech. Work	2.2	2.	2.4	2.2
Skilled Transportation Work	.6	.8	.5	.7
Teaching	34.6	44.4	43.6	39.2
Trade	10.2	7.6	7.	8.8
Miscellaneous Professions	2.5	1.4	1.8	2.1
Miscellaneous	.5	.6	.1	.5

TABLE XXII.—PERCENTS OF OCCUPATIONAL CHOICES, BY SIZES OF SCHOOLS

Occupational Choice	Class					
	I	II	III	IV	V	All
Clerical	18.1	15.8	17.7	15.2	12.4	15.9
Engineering	14.4	13.3	11.2	12.	10.4	12.4
Farming and Forestry	1.4	2.6	3.4	5.5	5.8	3.9
Law	4.9	3.5	3.6	1.6	1.1	2.9
Medicine	6.8	7.2	6.5	5.4	6.1	6.3
Philanthropic Work	.8	.7	1.	1.	.3	.7
Public Entertainment	2.4	2.9	2.4	1.8	2.2	2.3
Publicity	3.4	2.3	2.5	1.6	1.5	2.3
Skilled Manuf. and Mech. Work	2.5	1.9	2.3	1.6	2.9	2.2
Skilled Transportation Work	.5	.5	.7	.8	.7	.6
Teaching	27.8	38.2	38.7	42.6	50.5	39.2
Trade	12.4	8.6	7.8	8.8	5.	8.8
Miscellaneous Professions	3.6	1.7	1.9	1.6	.8	2.1
Miscellaneous	.9	.7	.1	.4	.3	.5

to teach. It will be recalled that the percent in the northern section of the state was 10 smaller than in either the central or the southern portion, and that the percent in schools of Class I was 10 smaller than in Class II and over 20 smaller than in Class V. These two facts are very closely connected. A much larger proportion of the seniors in the northern portion of the state were in Class I schools. When comparisons are made within the same class the difference between the sections becomes negligible in so far as the percents choosing teaching are concerned.